UNITED STATES DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY
WASHINGTON, D.C.

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FOREST MANAGEMENT
Ans.

FOREST ENTOMOLOGY

December 22, 1934

Ref to file
Project C-1

Regional Forester,
Missoula, Montana.

Dear Sir: Attention - Mr. Koch

Though we have been unable to prepare a formal report showing the results secured from the survey of the Coeur d'Alene forest relative to the mountain pine beetle situation, we are submitting this informal memorandum, relative to areas on which we believe control should be instituted in the spring of 1935. Though factors other than just the actual number of infested trees are involved in such decisions, they have been weighed as carefully as possible. I refer to the necessity of considering an infested windfall as an attacked tree, as well as the apparent secondary attack of decadent trees.

At the time this project was instituted, there were few infested windfalls, and standing trees were heavily attacked. Since that time the character of the infestation has been rather materially changed for there seem to be lots of infested windfalls and the attacks are rather light. Due to the peeling method of control practiced during the first years of this project which did not destroy newly developed adults, the percentage of early June attacks increased rapidly, though the August attacks were materially reduced. With the adoption of the burning method of control in both spring and fall operations, it is believed that there has been a marked return to a normal balance between these two periods of attack. During the past few winters there seems to have been an abnormally heavy blow-down of mature white pine which have been largely infested with light June attacks of the mountain pine beetle. In our surveys we have given the same weight to these infested windfalls as to an infested standing tree, as the cost for treatment would be the same or more. In doing this an inflated value is given to the infestation, as it has been estimated that three windfalls will not carry any more infestation than one normally attacked standing tree.

This season's data show a rather marked decrease in the number of infested windfalls. Unfortunately, a record was not kept of the total windfalls encountered, so we can not say if this decrease is due to the scarcity of such host material or whether the change in the proportion of early June attacks is responsible.

Regardless of cause, there has been a decided increase in the number of standing trees which have been attacked this year, which places the 1934 infestation in a different light than of the previous season.

It will be noted that in areas for which control is recommended there is still a large percent of what, for the want of a better name we have called defective trees. Though these trees harbor broods of the mountain pine beetle, in most cases it is obvious that the trees were in a decadent condition at the time of attack. Though in many cases the insect attack could not be considered as the primary injury, there can be no question but that it hastened the death of many trees.

A discussion of the areas recommended for control follows:

LITTLE RIVER DISTRICT
Honeysuckle Unit

Year	Acres	New attacks per acre	Total Trees	Percent windfalls
1933	5,320	.082	436	33%
1934	2,560	.36	922	52%

Of this number of trees, 186 have already been treated in an experimental tree-medication project conducted last August. Regardless of this fact there are still 736 trees which can be considered as a potential threat to the newly created experimental forest. For this reason it is believed that control would be justified.

SHOSHONE DISTRICT

Though the data from this year's survey shows a rather serious situation throughout this district, with a marked increase in the total number of infested trees, there are complicating factors involved which must be considered. These data also show a decrease in the number of infested windfalls, so that the increase which has occurred is entirely in standing trees which adds to the seriousness of the situation. To complicate this situation the data also revealed that a large percent of the standing trees which have been attacked are considered as defective, with bark-beetles being considered secondary in causing death. The presence of these defective trees, though varying for different units, makes the institution of control a doubtful procedure. In making this decision, an important question is the actual part which insects are playing in causing the premature death of such trees.

Do these attacks which are usually light cause the death of trees, which though apparently defective, might live for a number of years? This question is partially answered by the fact that there are a number of trees which die each year that are not attacked by beetles. Though the agency, or agencies, responsible for this condition are not fully understood, root fungi are undoubtedly playing an important part. These fungi are found in living trees though of course we have no data as to the percent of the total stand which is affected.

The situation on the Sissons Yellow Dog units and Downey Creek is a complicated one, which makes a decision as to the necessity of control rather difficult. The timber stand on these units is a very heavy stocking, averaging approximately 38 white pine trees per acre. It is obvious that this stand is so dense that the trees are suppressed and are perhaps in the same physiological condition as though they were mature. We do not know if the entire stand is in this condition, or if only a certain percent of the trees are so weakened as to become an easy prey to the attacks of the insects and disease. If the latter is true, then one could consider the loss of a certain percent of the trees as being a welcome release from an overcrowded stand which would ultimately produce a better forest. Under such a condition the institution of control in order to prevent the development of an epidemic which would destroy healthy trees as well as weakened ones, would be justified. On the other hand, if the entire stand is decadent, control measures would be ineffective in preventing subsequent losses. Though these data are not available, it is evident that there are more decadent trees within the area, as each year some individuals die that were not attacked, showing that there is a surplus of such host material.

The institution of control upon these areas, for the present at least, must be justified by an objective of preventing the further development of the present situation which would either destroy healthy trees within these units or menace other stands of timber adjacent. It should be borne in mind that regardless of the physical status of the timber stands involved, if control is not instituted, it is entirely possible that the existing infestation will develop into an epidemic which in the next few years will destroy a large percent of the remaining timber. However, in the event of such an occurrence, one cannot say how much of this loss would have occurred had no epidemic existed.

The data from these five questionable areas with a brief discussion follows. In studying these tabulations, it must be

remembered that those data relative to defective trees as well as the degree of attack were taken by the men engaged upon the survey and cannot be considered as positive, but as a general indication only.

SISSONS

	1933	1934
Acres	4,700	4,700
Total new attacks	1,203	1,407
Percent infested windfalls	17	4
Percent infested standing trees	83	96
Percent infested standing trees defective	80	84
New attacks per acre:		
Healthy standing	.042	.048
Defective standing	.170	.249
Windfalls	.044	.013
Total	.256	.310
Percent of attack:		
Heavy		22
Medium		45
Light		33

In this area, though there is over one-fourth of an infested standing tree per acre, the data indicates that but .04 of this amount is in healthy timber.

YELLOW DOG RIVER

	1933	1934
Acres	2,140	2,180
Total new attacks	824	922
Percent infested windfalls	42	1
Percent infested standing trees	58	99
Percent infested standing trees defective	90	91
New attacks per acre:		
Healthy standing	.022	.039
Defective standing	.201	.386
Windfalls	.162	.006
Total	.385	.431
Percent of attacks:		
Heavy		14
Medium		42
Light		44

This area also shows a heavy infestation of standing trees, but only .039 trees per acre are in healthy timber. However, this is a heavy infestation and would seem to be the forerunner of a more serious situation.

YELLOW DOG CREEK

	1933	1934
Acres	4120	4120
Total new attacks	309	795
Percent infested windfalls	55	48
Percent infested standing trees	45	52
Percent infested standing trees defective	No data	56
New attacks per acre:		
Healthy standing)	.034	.044
Defective standing)		.056
Windfalls	.041	.093
Total	.075	.193
Percent of attack:		
Heavy		21
Medium		46
Light		100

This infestation is not so heavy though it will average an infested tree for every five acres, with nearly half of the attacks being in healthy timber.

NORTH YELLOW DOG

	1933	1934
Acres	840	840
Total new attacks	315	196
Percent infested windfalls	95	40
Percent infested standing trees	5	60
Percent infested standing trees defective	No data	55
New attacks per acre:		
Healthy trees)	.019	.062
Defective standing)		.078
Windfalls	.356	.094
Total	.375	.234
Percent of attack:		
Heavy		27
Medium		53
Light		20

Though the infestation on this area has decreased by .141 trees per acre during the past year, there has been a marked increase in the number of standing trees with a total of nearly 1/4 tree per acre. This would seem to be a rather serious infestation.

DOWNEY CREEK

	1933	1934
Acres	4160	4160
Total infested trees	822	1223
Percent infested windfalls	29	10
Percent infested standing trees	71	90
Percent infested standing trees defective	No data	71
New attacks per acre:		
Healthy trees)	.141	.076
Defective trees)		.190
Windfalls	.058	.028
Total	.199	.294
Percent of attacks:		
Heavy		21
Medium		40
Light		39

This infestation has increased 1/10 of a tree per acre during the past season, with a marked decrease in the number of infested windfalls. This makes this a rather serious situation.

These data depict the difficulty of making a decision as to the advisability of instituting control on these five areas. The situation has been presented in detail, in order that our position can be properly understood. In summarizing, we have the following facts to consider.

An infestation exists which under normal conditions would more than justify control. Though the infestation on these areas showed a marked decrease following the institution of control in 1930, it has steadily increased, until at this time the number of infested trees per acre has again reached the same level. This increase occurred in the face of continuous control, conducted during three subsequent consecutive years. Control was discontinued on these areas in 1933, as at that time it was evident that a large percent of the infestation consisted of light attacks in non-resistant host material such as windfalls and decadent trees, in which the insects were considered as secondary. This season's

data shows an increase in the number of infested trees, with a marked decrease in the number of windfalls. Furthermore, there has also been an increase in the number of healthy trees which have been attacked and killed.

These data, though not positive, do indicate a steady increase in the infestation, with rather definite assurance that an extremely serious situation will develop causing unnecessary timber losses and reinfestation of adjacent areas. In considering the institution of control, though the infestation should drop following the operation, no assurance can be given that it will not increase in a manner comparable to that which occurred following the 1930 project. If this does occur, the only benefits of control will be the reduction of the insect population to a minimum, which will confine the loss to decadent trees and windfalls. Such a situation will require a rather permenent program of maintenance control, until such time as more lasting results may follow. Control may not be an annual requirement, but only at such intervals when the existing situation indicates the necessity for further action. In view of the potential danger of the existing situation, we recommend the institution of control for these areas, which is based only upon the entomological phase of the problem.

The following five units of the Shoshone district are quite different from the five previously discussed, and we feel that there is no question as to the need for control.

LOWER FLAT CREEK

	1933	1934
Acres	4120	4120
Total infested trees	923	717
Percent infested windfalls	50	25
Percent infested standing trees	50	75
New attacks per acre:		
Healthy standing)	.112	.068
Defective standing)		.048
Windfalls	.112	.058
Total	.224	.184
Percent of attacks:		
Heavy		36
Medium		39
Light		25

Though there has been a decrease in the total amount of the infestation, this was due to the decrease in the number of windfalls

attacked, so in reality a more serious situation exists.

BENNET CREEK

	1933	1934
Acres	580	580
Total infested treed	290	144
Percent infested windfalls	100	23
Percent infested standing trees	0	77
Percent infested standing trees defective	0	0
New attacks per acre:		
Healthy standing	.000	.196
Defective standing	.000	.000
Windfalls	.500	.059
Total	.500	.255
Percent of attack:		
Heavy		54
Medium		31
Light		15

The infestation in this area is also lower than in 1933, but at that time it was recorded as being entirely in windfalls. This year 77 percent of the trees are standing, with no defectives recorded.

BRETT MINER

	1933	1934
Acres	1550	1550
Total infested trees	193	249
Percent infested windfalls	78	20
Percent infested standing trees	22	80
Percent of infested standing trees defective	No data	62
New attacks per acre:		
Healthy standing)	.028	.048
Defective standing)		.081
Windfalls	.097	.032
Total	.125	.161
Percent of attack:		
Heavy		45
Medium		40
Light		15

The infestation shows an increase in the total infestation as well as in the number of standing infested trees.

ROCK CITY

	1933	1934
Acres	1600	1600
Total infested trees	480	194
Percent infested windfalls	66	14
Percent infested standing trees	34	86
Percent infested standing trees defective	None	None
New attacks per acre:		
Healthy standing)	.102	.078
Defective standing)		.026
Windfalls	.198	.017
Total	.300	.121
Percent of attack:		
Heavy		68
Medium		29
Light		7

Though a general decrease in the infestation is shown by these data, there has been a marked increase in the percent of standing trees attacked.

CABIN CREEK

	1933	1934
Acres	7000	7000
Total infested trees	916	1631
Percent infested windfalls	54	47
Percent infested standing trees	46	53
Percent infested standing trees defective	50	17
New attacks per acre:		
Healthy standing	.030	.103
Defective standing	.030	.020
Windfalls	.070	.110
	.130	.233
Percent new attack:		
Heavy		44
Medium		41
Light		15

A marked increase has occurred in the total infestation as well as a small increase in the number of standing trees, which make this situation a rather serious one.

In view of the data as presented, it is recommended that control measures be instituted in these five areas in the spring of 1934. The following tables show the areas for which control has been recommended:

Area	Acres	Trees
Honeysuckle	2560	922
- Lavern-Flat Creek	4120	717
- Bennet Creek	580	148
- Brett Mine	1550	249
- Rock City	1600	194
- Cabin Creek	7000	1631
Sissons	4700	1457
North Yellow Dog	840	196
Yellow Dog River	2140	922
Yellow Dog Creek	4120	795
Downey Creek	4160	1223
	33,370	8454

We hesitate to offer an estimate relative to the cost of this operation, though it is believed that it will be at least $7.50 per tree. We will be pleased to have your comments relative to the situation described in this memorandum as well as to recommendation made. If we have failed to make any part clear, we would be pleased to offer further explanation.

Respectfully submitted,

James C. Evenden /B

T. T. Terrell /B